NC Nutrient Criteria Development Plan – Scientific Advisory Council (SAC) 02/19/2020 Meeting

Attendees

SAC Members in Attendance
Martin Lebo
Nathan Hall
Jud Kenworthy
Lauren Petter
Hans Paerl
Jim Bowen
Wilson Laney
Michael O'Driscoll
Marcelo Ardon
Jessie Jarvis

CIC Members in Attendance
Anne Coan
Doug Durbin

NCDEQ Staff in Attendance
Heather Jennings
Jing Lin
Connie Brower
Nora Deamer
Pam Behm
Susie Meadows
Peter Johnston (WebEx host)
David Huffman
Karen Higgins
Julie Ventaloro

SAC Meeting Facilitator
Jenny Halsey

Meeting notes

All questions, comments and answers are paraphrased

1) **Convene** (Jenny Halsey and Jim Hawhee)
   a. <u>Introductions</u>: Jim Hawhee has replaced Brian Wrenn as leader of this group, the Water Planning Section of DWR is taking on more responsibility for this group, and Peter Johnston will be helping with administrative matters.
   b. <u>Prior Meeting Minutes</u>: October 2019 Minutes were approved. December 2019 were approved conditioned on two changes:

      i. On page 3, there is a reference to Alabama, but that should be Florida.

      ii. On page 5, 3b, the word "flow" is missing, it should read that the duration of flow is being managed to maintain adequate DO.

c. <u>High Rock Lake Update</u> (Jim Bowen): This process started in 2015. In our 2018 meeting, we thought we had an agreement about criteria, but there were still unresolved details. So we decided to write a draft criteria document for the CIC with 5 chapters, and we agreed to make 4 key changes. Those changes were made, and last week we sent those changes out to the group. We are waiting to hear back on any comments. The 5 chapters are:

      i. 1: Introduction, this chapter is pretty much done.

      ii. 2: Literature Review, there are a few missing pieces.

      iii. 3: Review of Conditions in High Rock Lake and Use Support, there is a complete draft ready to be sent out for review.

      iv. 4: Specification of Criteria, this chapter is pretty much done.

      v. 5: Lessons Learned and Statewide Application, the status of this chapter is likely complete but needs to be verified.

2) **Nutrient Criteria Development Exercise** (Lauren Petter, Jim Hawhee, Jenny Halsey)

a. <u>Explanation of Details</u>:

      i. There are 4 double tables that serve as stations, each with a team captain: Nora and Pam are captains of the rivers and streams criteria tables, and Connie and Chris are captains of the estuarine criteria tables. Everyone was asked to divide up roughly equally while sitting at a table associated with their expertise. Rachel worked independently via WebEx.

      ii. The focus of this exercise is on the process for developing numeric nutrient criteria, as opposed to the actual criteria itself (although that matters too).

      iii. Basic concepts to cover

          1. Distinctions between candidate thresholds and criteria – criteria that protects the most sensitive use by definition protects the whole waterbody.

          2. 3 primary non-exclusive ways to develop criteria per EPA

             a. Reference condition approach

             b. Stressor response information

             c. Scientific literature

          3. Explanation of concepts of Magnitude, Frequency, and Duration

b. <u>Group Results Attached as Appendices</u>: Each group summarized their results on a poster-sized piece of paper. Photographs of those results are attached to the end of this document as follows:

      i. Appendix A: Connie's group results

      ii. Appendix B: Chris' group results

      iii. Appendix C: Nora's group results

      iv. Appendix D: Pam's group results

c. Connie's group (Estuaries): This group looked at each grouping of data to determine if it was valuable in making the decision but stayed away from whether it was perfectly applicable to Albemarle.

    i. This group did consider:
1. Stressor response values: seagrass was important, macroalgal cover and diatom index are important. However, there isn't enough NC data to compare those values.
2. Percent nuisance and harmful algal, thinking about biomass vs algal count: This is a component we'd like to use. Invert and tolerant invert was possibly too hard to use for our decision.
3. Percent DO: valuable, fish index also valuable.
4. Chesapeake Bay decisions and one thing out of Florida related to clarity value (that specific thing wasn't specified).

    ii. This group did not consider:
1. Fish Index: more information was needed from DMF regarding striped bass and sturgeon.
2. Reference-based values: These are challenging, as salinity can vary, so they weren't used except for one exception: impaired sites decision for a frame of reference.
3. Scientific literature values from MA and Cape Cod Bay, and Tampa Bay, because the conditions of those regions aren't relevant to the Southeast.

    iii. Questions/Follow Up Comments:
1. There is an obligation to protect all uses, but not every single little flea.
2. Removing all the nutrients wouldn't support the fish, so a balance is needed.
3. The context to keep in mind here is that these water quality standards are being implemented in water quality protection programs, so we need specific numbers.
4. The group was asked if they considered issues of tidal/non-tidal/micro-tidal, but the group didn't consider that because they didn't have that information.
5. The group didn't consider duration and frequency.

    iv. Chris Ventaloro's group (estuaries)
1. The biggest takeaway is that it was difficult to talk about estuaries in context of this exercise, not within the context of the Albemarle Sound. Most of the conversation was about the Albemarle. We looked at the reference info that was available to determine the most sensitive endpoint (SAV). We decided that chlorophyll a is a good, general nutrient indicator in estuaries.
2. There were a lot of assumptions and concerns, including influence of salinity and tidal flows. Ultimately we decided that chlorophyll a was the

easiest knob to tweak and that inorganic turbidity and color should also be considered. Other indicators of concern are DO and harmful algal blooms. We didn't venture much into causal parameters.

3. Questions/Discussion:
    a. It is useful in any estuary to look at the relationship between mean chlorophyll values and whether or not HABs show up.
    b. Salinity: Need to be careful using SAV as an endpoint because it doesn't take much change in salinity to affect those species.
    c. There was a discussion about using the Chesapeake Bay as a reference and what the proper typical residence time is.

v. Nora's group:
    1. Lots of assumptions were made, and the scientific literature wasn't helpful. We reviewed the stressor response information and made more assumptions.
    2. We approached this by taking the most sensitive response variables using the change point. We multiplied the lowest change point number (TP) by ¾.
    3. We used reference information to verify stressor response value.
    4. Frequency and Duration: Growing season because we thought the data we had was for growing season. But, growing season may not be the most appropriate use. We also assumed that the subject matter was small, wade-able streams, not the big Chowan River. We decided on 1 in 5 exceedance after discussion.

vi. Pam's group:
    1. We took a similar approach to Nora's group in that we ignored the literature because there were too many questions about it. We assumed that we are dealing with Class C small wade-able streams, that if we protected for aquatic life we'd protect for other class C uses too, that growing seasonal means some kind of average, and that sites that were meeting uses included nutrients, but not necessarily downstream.
    2. Stressor response values: interpolated means the value that corresponded with the 75th reference value and that change point was the point where things shifted. That change point should be avoided.
    3. The most relevant response parameters were the diatom index, EPT richness, and fish richness.

d. Jim Hawhee posed a rhetorical question to everyone: Is there an approach or information you found compelling enough in this hypothetical exercise such that you'd want to see that approach/info when we do this for real? Jim also set a soft goal of developing nitrogen and phosphorous criteria over the course of the next year.

e. Hans Paerl: one really big need in Albemarle Sound is to get a much better understanding of what the sources of nitrogen are in the system. Some evidence indicates that nitrogen fixation in the system could be important, and we should come

to grips with that now. We should get a better handle on the nitrogen budget. A group discussion followed.

3) **Refined List of Potential Response Endpoints for Criteria Development in AS/CR** (Connie Brower and Chris Ventaloro)
   a. Chris: In the December SAC meeting, we had a discussion about potential endpoints to consider for Albemarle Sound and the Chowan River. We wanted to look at the indicators that would be the easiest to link to nutrients and available data.
   b. Connie: If an endpoint isn't on here, it doesn't mean that we've eliminated it from consideration. There are some endpoints that we don't have enough information for, so we decided not to include those on this chart. Also, the order of this chart is subject to change.
   c. Anyone who wishes to add an endpoint is encouraged to tell the group about what they want to add and why. This list should be considered fluid and can be further discussed at our next meeting as well as during internal NCDP meetings
   d. Hog Choker discussion: There was a discussion about looking at Hog Choker data. It is a tolerant species that isn't affected by commercial fishing and is a good indicator of stability. Also, although it is resilient, its prey may not be, and if nutrient changes cause Hog Chokers to find a different prey fish, that may impact their numbers. However, one distinction to make is between a general indicator of ecosystem health (like Hog Chokers) and the fact that that species isn't sensitive to nutrient related input.
   e. The group had some further discussions about modifying the chart.

4) **Overview of NSTEPS Remote Sensing Project** (Jim Hawhee)
   a. Introduction: EPA has an informal NSTEPS grant whereby you indicate information you'd be interested in getting, and if EPA has the resources, they'll make it happen. During phase 1, we worked with the NASA development program asking them to help to resolve satellite imagery. However, that project didn't have much success drawing correlations between remote sensing data and our on the ground monitoring data.
   b. Review of the "Work Plan for Exploring Phytoplankton Dynamics in the Chowan River/Albemarle Sound using *in situ* Water Quality Data and Satellite-based Remote Sensing under Nutrient Scientific Technical Exchange Partnership Support (N-STEPS)." Jim Hawhee explained this this document has already been sent in, but if we see anything big, we may be able to make changes. Jim then went over the document and summarized it. The key piece is Task 6: Analyze Spatial and Temporal Changes. This tries to relate our on the ground phytoplankton data to our remote sensing data to see if we can draw strong enough correlations to make better spatial inferences about what is happening in the sound and where.
      i. There was a discussion about "remote sensing stuff" and aquasat data.

5) **Preliminary Evaluation of DO Endpoints for Criteria Development in AS/CR** (Jim Hawhee)

a. Discussion about compelling DO endpoints: Jim Hawhee noted that he sent a few resources via email and referenced the Phase I Nutrient Criteria and Research Proposals document. He explained that this is just a starting point so we don't have to reinvent the wheel. DWR staff is going to start looking at DO criteria over the next few months. Jim also noted that anyone in the group is welcome to email him about these documents and that this material is open for discussion. A group discussion followed.

6) **Wrap-Up, Closing Remarks, and Adjorn** (Jenny Halsey)
   a. Our next meeting is April 15 on the coast, and the June meeting will be back in the Triangle.

APPENDIX A: DISCUSSION RESULTS CHART FOR CONNIE'S GROUP

Estuaries

	TP mg/L	TN mg/L
"SAV" Seagrass	0.04	0.29
Harmful Algal	0.042	0.31
DO	0.071	0.5
(3 specus index - s.bass) (sturgeon, key choku) Fish Index	0.12	0.621
Recommendatu	0.05	0.4

APPENDIX B: DISCUSSION RESULTS CHART FOR CHRIS' GROUP

EST.

REF COND APPROACH w/ LIT SUPPORT

SENSITIVE END POINT = SAV

INDICATOR = CHL-a

CRITERIA REC.

CHL-a < 15 ug/L
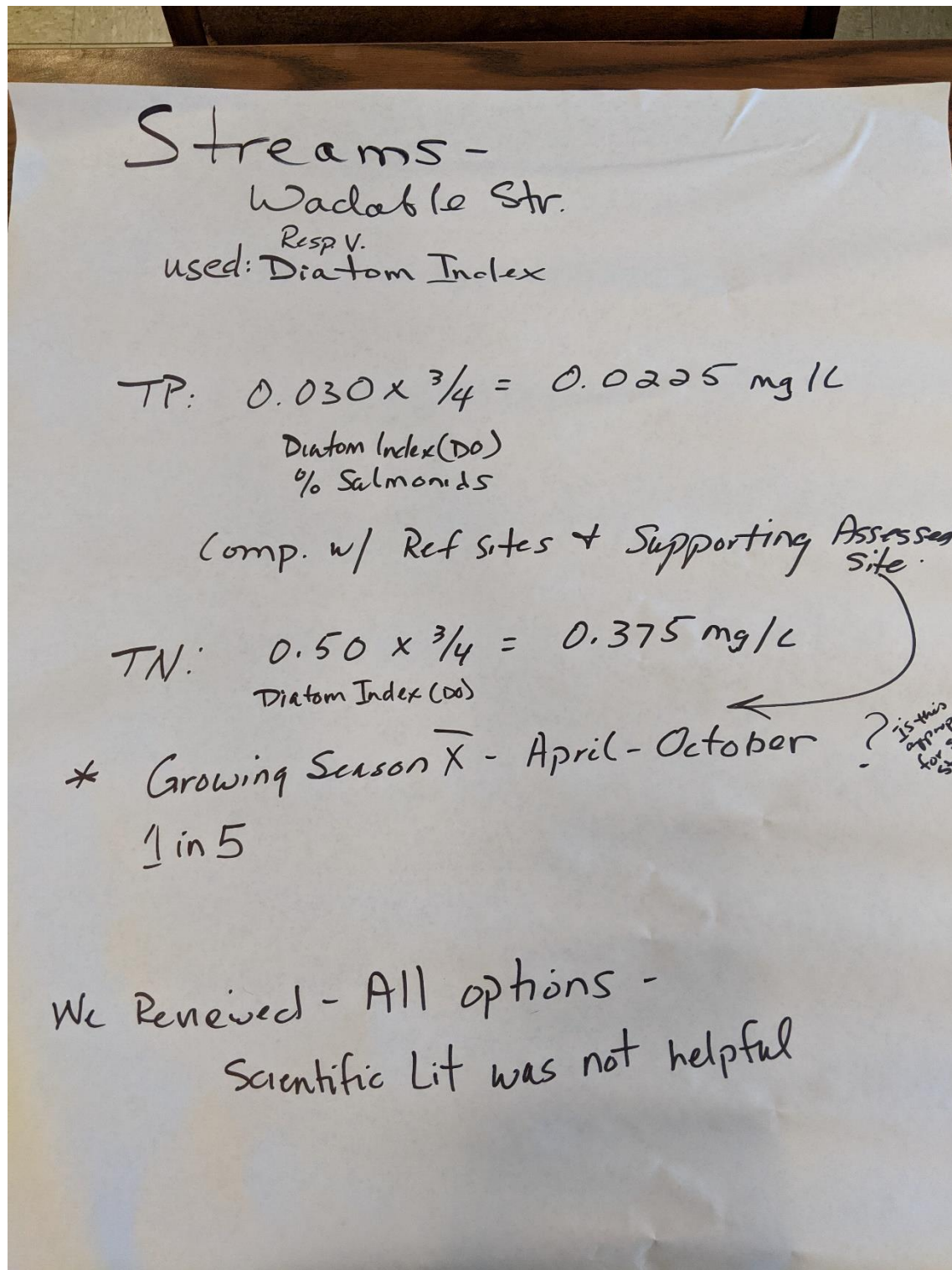
DURATION = MONTHLY MEAN OVER
GROWING SEASON

FREQ = NOT > 10% EXC

ASSUMPTIONS/CONCERNS:

- CHL-a IS THE EASIEST KNOB TO TWEAK / MOST DIRECTL__
  UNKED TO N__

- INORGANIC TURBIDITY, COLOR WOULD BE KEY, ALSO
  CHL-a + INCID OF HABs (WHAT IS THIS RELATIONSHIP?)

- OTHER INDICATORS OF INTEREST
  HAB, DO

- SALINITY - ELEPHANT IN THE ROOM

APPENDIX C: DISCUSSION RESULTS CHART FOR NORA'S GROUP

- Non-event concentrations
- Base flow readings
- All growing Season data used

APPENDIX D: DISCUSSION RESULTS CHART FOR PAM'S GROUP